A

LECTURE &c.

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LECTURE

ON THE

SITUATION of the large BLOOD-VESSELS of the Extremities;

The DESCRIPTION of the Inſtrument called TOURNIQUET; and

The Methods of making effectual PRESSURE on the ARTERIES, in Caſes of Effuſions of Blood from Wounds, &c.

DELIVERED TO THE SCHOLARS OF THE

MARITIME SCHOOL, AT CHELSEA,

BY WILLIAM BLIZARD, F. A. S.

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And Lecturer on Anatomy and Surgery.

Prodeſſe quàm conſpici.

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The 26th of February, 1782.

At an Extraordinary General Court of the Governors of the MARITIME SCHOOL;

Reſolved,

That the Thanks of this General Court be preſented to MR. BLIZARD, for his genteel offer of inſtructing the Scholars in the method of applying the Tourniquet; which the Governors accept with pleaſure.

By Order of the General Court.

JOHN PUGH,
Secretary.

INTRODUCTION.

FROM reflections on my duty, as SURGEON of the MARITIME SCHOOL, and an affectionate regard for the objects of my care, I was induced to propose to teach them, the situation of the large blood-vessels of the extremities, and the method of applying the TOURNIQUET. This I attempted, in the plainest manner in my power, in the way of LECTURE; as the most familiar and effectual method of impressing truths on juvenile minds: and it was pleasing to observe

the ſteadineſs, mixed with humane feelings, ſo ſtrongly expreſſed in the countenances of my attentive young auditors.

From an anxious wiſh to do good to mankind; and particularly, to promote the great cauſe of the naval intereſt of my country, in that moſt eſſential concern, *the preſervation of the lives of ſeamen*; I have now endeavoured to render my Lecture a uſeful OFFERING to theſe young warriors.

There cannot be a doubt, that, in the navy and army, caſes continually occur, in which the information it contains is abſolutely neceſſary to the preſervation of exiſtence: but there can hardly be any ſituation of life in which, at ſome period, the knowledge may not prove of equal importance; and it cannot fail of adding

to

to confidence and courage in the moment of danger.

No profeſſional fame can be acquired from the explanation of facts known to every ſtudent in ſurgery: it is, therefore, to be conſidered as an humble work of humanity, which may poſſibly prove the happy means of ſaving the limb or life of many a brave man.

Lime Street,
15th July 1783.

A

LECTURE, &c.

Young Gentlemen,

I Think it my duty, as one of the guardians of your health and lives, to point out, whatever I judge may conduce to the preſervation of theſe bleſſings when you are launched into the world, as well as during your reſidence in this ſeminary of naval ſcience.

You

You are here educated to a profeſſion the moſt honourable in the nation, becauſe the moſt uſeful to your fellow-citizens. It is the ſecurity of our country, our religion and laws, our commerce and riches. The SEAMAN then, according to his rank and merit, has a peculiar claim to the reſpect and care of his countrymen.

You are ambitious to become SEAMEN, are ready to join the veteran band, to go forth to fight the enemies of your country; and therefore merit the eſteem and ſervices of all your countrymen.

But we are excited to attend to the welfare of the BRITISH SAILOR by another conſideration — Trained up in the principles of true honour and bravery; hardy in the practice of them; and

properly

properly conſidering his life as devoted to the ſervice of his country; he is leſs mindful of bodily evils, and the means of averting them, than the more wary and delicate landſman. He has a title, then, in generoſity, to that attention from others, which a martial ſpirit prevents him from ſhewing to himſelf.

I am aſſured, Gentlemen, that, when you ſhall command in his majeſty's ſhips, you will have many occaſions for the exerciſe of your judgement and ſpirit in regard to the health and lives of your men. You muſt, in almoſt every caſe, *reflect for them*; and, when they find that you are truly zealous in all things for their good, they will obey with the more alacrity, will bear you with ſpirit through all danger, and prove themſelves worthy

of

of your generous regard.——Theſe conſiderations will, I truſt, engage your attention to whatever ſhall promiſe benefit to your hardy companions in war.

Every good and brave man would lay down his life in the execution of his duty to his king and country. But, when ſick or hurt, we are not to neglect the means of relief which Providence has afforded. On the contrary, we are commanded, by divine authority, to preſerve our lives, and thoſe of our fellow-creatures.

For the preſervation of the health and lives of the officers and ſeamen of his majeſty's navy, there are appointed by government to each ſhip of war, a SURGEON, and a certain number of mates according to the rate of the ſhip. During

ring the time of action the ſtation of theſe gentlemen is in the COCK-PIT. From their neceſſary confinement to this ſituation, evils of great conſequence may ſometimes happen; for they cannot poſſibly render inſtantaneous aſſiſtance to thoſe in a remote part of the veſſel, whoſe bleeding wounds may urgently require the aid of ſurgery.

Some of the methods of relief of ſurgery are very ſimple, though of the greateſt importance. Of this kind is the making an effectual temporary preſſure upon a part, to prevent a fatal effuſion of blood, in caſes of wounds, till means of permanent benefit can be employed.

Men of true courage are not diſmayed at the ſight of blood. In firm poſſeſſion of themſelves on all occaſions, they are capable of exereiſing their judgement,

and employing the means with which they are happily acquainted, either to their own benefit or that of others. It is ſurely proper, then, that they ſhould have information of whatever may be uſeful, and in their power to execute.

I cannot omit this opportunity, my young Friends, of exhorting you to be examples of ſobriety through life. What advantages can flow from reaſon or true courage in a ſtate of intoxication? It is to be feared that many a brave ſeaman has loſt his life from having his mind clouded, by the effects of ſtrong liquor, at the time of receiving a wound.—All that is good is the gift of heaven! Religion enjoins us temperance. It is good to be temperate; for by this virtue not only are our bodies preſerved

free from many diſorders, but our minds maintained calm and firm, to direct under circumſtances of accidents, and on every trying occaſion.

Induced by the reflections that I have advanced, I propoſed to the wiſe and good men who direct your education, to teach you the application of the inſtrument called TOURNIQUET, employed for ſtopping the flow of blood from wounded veſſels. With their ſanction I have now the pleaſure of addreſſing you; and moſt heartily wiſh that my inſtruction may prove uſeful, not only to yourſelves, but alſo to thoſe gallant men you may lead to glory!

A circumſtance has occurred, ſince I propoſed to meet you on this occaſion, which has confirmed me in my notions,

reſpecting the utility of what I am proceeding to explain; and will, I have no doubt, be highly ſatisfactory to your Governors.

I requeſted the ſentiments of a very intelligent naval ſurgeon on this ſubject. This was his anſwer.

" I can beſt expreſs my opinion by " relating to you the ſentiments and " practice of an ingenious ſurgeon in the " ſervice, and aſſuring you that mine " perfectly coincide with his.——Mr. " Bird, ſurgeon of the Barfleur, " had obſerved, with great concern, the " dreadful effects of wounds that happened in time of action, from the ſeamen " being entirely ignorant of the manner " of applying the tourniquet, many inſtances having occurred of men bleeding to death, particularly in the

" tops,

" tops, before any aſſiſtance could poſ-
" ſibly be rendered them. To prevent
" theſe evils as much as was in his
" power, he provided every ſeaman ſta-
" tioned in the tops with a tourniquet;
" and, on every opportunity, taught them
" the method of applying it, ſo that in
" a ſhort time they became perfectly
" expert in its uſe."

The pious Pſalmiſt beautifully exclaims, " We are fearfully and wonder-
" fully made!" It would, indeed, require the ſtudy of a long life to learn the little that has been diſcovered of infinite wiſdom in the ſtructure of the ſeveral parts of the human body; and of infinite goodneſs in the laws by which they perform their functions to the maintenance of health and life.

It is proper, however, that you ſhould have a general idea of Nature's œconomy, in the circulation of the blood; to underſtand the practice that will be laid down, and to enable you to adapt it to particular caſes.

"In the BLOOD is the life of man." That is to ſay, this fluid contains the principles of nouriſhment, and diſtributes them to every part of the body for its ſupply and refreſhment. Like the water of the great ocean, which conveys the riches and good things of the world to every corner of the globe.

The HEART is the ſource of this fluid. It is ſeated in the breaſt, as it were in the center of the body, a little to the left ſide. This organ is hollow for containing the blood; and it has the power of con-

contracting, and very ſtrongly propelling its contents. By this contraction of the heart the blood is puſhed forwards, with an exceedingly rapid current, to the remoteſt parts of the body; like the tide of the ſea, which influences and preſſes on the waters of rivers, as we obſerve here in the delightful Thames.

The veſſels, or tubes, which proceed from the heart to convey the blood to all the parts of the body, are called ARTERIES. From the power with which the heart propels the blood through this ſyſtem of veſſels, whenever they are wounded, the blood flows from them with great rapidity. They divide, to be diſtributed to parts, from ſingle trunks, like the branches of trees from their bodies; ſo that by preſſing

ſtrongly againſt the ſides of any trunk, the flow of blood into its correſpondent branches will be prevented.

The veſſels which return the blood to the heart are termed VEINS. In them the blood receives but little of the impelling force of the heart, and therefore, inſtead of moving with a ſtrong tide or current, glides evenly and gently on; and, of conſequence, wounds of theſe veſſels are not of much importance.

This tranſmiſſion of the blood from the heart through the arteries, and back to it again by the veins, is termed the CIRCULATION; and, to the honour of this nation, was the diſcovery of our illuſtrious countryman DR. WILLIAM HARVEY.

It is very plain, then, that if a bandage or ligature be made ſufficiently tight around

around any limb, the flow of blood into all the parts below it muſt be prevented. But, to render this effectual, the preſſure muſt be very great in the whole circumference of the limb; and, in ſome caſes, from the ſituation of arteries between bones, the effect cannot well be obtained. To render this proceſs, therefore, ſucceſsful with certainty, in caſes of wounds and operations; and at the ſame time to prevent the evils ariſing from an exceedingly ſtrong *general* preſſure, ſurgeons have fixed on certain proper parts of the *trunks* of arteries, before their diviſion into branches, for the application of a pad or compreſs. Theſe parts are expreſſed in the annexed plate.

The PULSE, ſo called, is the beating

of an artery, from its diſtention with blood propelled into it by the heart. The ſpaces of time between the pulſations, are the periods when the heart itſelf is filling with blood returned to it by the veins.

Now it is evident that there can be no pulſation when a flow of blood and diſtention of an artery are prevented. Where, then, a pulſe can conveniently be found, as in the wriſt, the ceaſing of it, on a preſſure being made on the trunk above, will prove that the preſſure is made effectually. To illuſtrate this by an experiment.

Let a friend feel the pulſe in your wriſt; then apply two or three fingers in *the little pit, immediately below the collar-bone, cloſe to the ſhoulder*, marked *a* in

in the plate; preſs ſtrongly, and the pulſe will ceaſe, becauſe the artery that ſupplies the upper extremity paſſes under the collar-bone, over the firſt and ſecond ribs, along this part, and will be now preſſed againſt one of theſe ribs. Remove the fingers, and again apply them, and the pulſe will be found to alternate with the preſſure.

Now, ſuppoſe a wound to be received, an artery of a conſiderable ſize cut or torn, and a copious bleeding in conſequence to happen, in any part of the arm *below* the place *a*; it appears manifeſt, that by making a preſſure with the fingers, in the manner deſcribed, or aſſiſted by a pad between the fingers and the part, the bleeding would inſtantly ceaſe. Is not this a uſeful remark? Let this little proceſs

ceſs be your firſt exerciſe; and, when you are expert in the practice of it, proceed to conſider the other places in the limbs where effectual compreſſion may be made; and the inſtruments proper for the purpoſe.

The arteries of the upper extremity, or arm, proceed from the trunk at *a*, after this manner. This trunk paſſes behind the fore margin of the axilla or arm-pit. It is then ſituated deeply in the arm-pit; *paſſes along the ſide of the arm*, next the body, *obliquely towards the fore part of the joint or bend*, and here it divides into three branches. In this courſe to its diviſion it lies near the bone, and may therefore be very ſucceſsfully compreſſed. —The ſituation of this trunk to its diviſion is deſcribed in the Plate by the lines *b*.

All

All compreſſive means for preventing the flow of blood from wounded arteries of the upper extremity, muſt therefore be made either at *a*; or in ſome part of the courſe of the trunk of the artery, expreſſed by the lines *b*, between the axilla, and the bend of the arm.

The diſtribution of the veſſels of the lower extremity is in this manner. The artery paſſes from the cavity of the belly to the GROIN, where in thin perſons the pulſation of it may be felt.

At this place, in caſes of wounds and effuſion of blood very high up in the thigh, effectual compreſſion may be made by ſome fingers preſſed very ſtrongly, in the manner deſcribed for compreſſion below the collar-bone; though it were better

better to have ſome kind of ſtrong pad, or firm body, ſuch as will be preſently deſcribed, interpoſed between the fingers and the part.

From the groin the artery proceeds in an oblique direction downwards and inwards, as expreſſed by the lines *c*; and, *at about the middle of the inſide of the thigh*, expreſſed by the pad *d*, *it lies cloſe to the bone*. This is the moſt favourable part for making a preſſure upon it, becauſe of the reſiſtance of the thigh-bone behind. And, where there is an opportunity of a choice, as in caſes of wounds or operations *below* this part, this is the place which ſurgeons fix on for the application of the compreſſing body; it, therefore, deſerves your particular attention.

The courſe of the veſſel is then downwards

wards and backwards to the HAM, in the hollow of which, *againſt the lower flat end of the thigh-bone*, compreſſion may again be very ſucceſsfully made, in all caſes of wounds or operations below the knee joint. But *beyond* this part compreſſion muſt not be depended on; for immediately below the joint the artery divides, like that of the upper extremity, into three veſſels, one of which is ſituated between the bones of the leg.

Science and humanity admit of no diſtinction of country; but, with equal juſtice, expreſs the gratitude of mankind to the memory of the authors of uſeful inventions, and diſcoveries. — The inſtrument called TOURNIQUET, we are informed, was the invention of a *French* ſurgeon, named MORELL, at the ſiege of BESANÇON,

Besançon. It conſiſts of four parts, viz. 1. *e*, a yard and half of ſtrong worſted, or other kind of band, an inch broad. 2. *f*, a pad of leather, tightly ſtuffed with wool or horſe-hair, two or three inches long, and of an inch breadth and thickneſs, having a loop on one ſide for the band to ſlide through *. 3. *g*, a piece of ſtrong leather, three inches long and two broad, having two apertures, an inch aſunder, for the paſſage of the band or ligature. 4. *h*, a piece of ſmooth round and ſtrong wood, about four inches in length.

Things of great ſimplicity loſe advan-

* It has been ſuggeſted to me, that, for the uſe of perſons who may not retain an accurate remembrance of the ſituation of the large veſſels, it were better for this pad to be made as large again as here deſcribed.

tages

tages from deſcription, in ſeeming complicated. The price of this inſtrument, one or two ſhillings, is ſo trifling, that whoever ſhould wiſh for full information on the ſubject, would certainly do well to provide himſelf with one *. The ſlighteſt view will inform him of the manner of employing it; which is this. —Place the pad upon the part of the trunk of the artery it is intended to compreſs; bring the band, paſſed through the loop of the pad, round the limb, and carry the ends through the apertures in

* It is much to be regretted that this inſtrument is not generally known, and kept in every family.—The life of a valuable gentleman in Hertfordſhire would have lately been loſt for want of it, if a ſurgeon had not *accidentally* called at his ſeat in the moment of a dreadful effuſion of blood, from a wounded artery in his hand, occaſioned by the breaking of a bottle in a fall.

the leather; make a double knot with the ends, leaving a ſpace between the knot and leather that would admit three or four fingers; through this ſpace paſs the ſtick, and with it twiſt the ligature ſufficiently tight to ſtop the flow of blood through the artery into the limb. The leather, knot, and twiſting are to be placed and made upon the upper part of the limb, nearly oppoſite to the pad.

It is manifeſt that this proceſs, ſimple as it is, requires both hands for tying the knot; and, therefore, that you could not apply the Tourniquet to your own arm without aſſiſtance. It is as clear alſo, that it demands a conſtant application of a hand to the ſtick, as the ligature would otherwiſe inſtantly become ſlack.

To obviate the neceſſity of two hands, in regard to the arm, let the ligature be about twelve inches long, and have each end tied in a loop: proceed in its uſe exactly as already deſcribed; but, inſtead of making a knot over the leather, paſs the ſtick through the loops at the ends of the ligature, and then perform the twiſting.

To fix the ends of the ſtick, ſo as to prevent the ligature from untwiſting, or the neceſſity of a conſtant application of a hand; make a hole through each end of the ſtick, paſs a piece of tape or packthread through each of theſe holes, carry them round the limb, and tie or pin them. Many other little expedients may be contrived to anſwer this purpoſe.

Beſides the Tourniquet that I have

deſcribed, there is another, an excellent piece of machinery. The original was invented by M. PETIT, a Frenchman; but it was much improved by the late MR. FREKE of St. Bartholomew's Hoſpital. It need only be ſeen to be underſtood. The pad *i* is placed upon the artery; the ligature buckled at *k*; and then, by turning the ſcrew, the upper moveable portion *l* is raiſed from the lower, and, in conſequence, the ligature drawn tight. This inſtrument is ſold by ſurgical inſtrument makers for half a guinea; it is made of braſs, and is called SCREW TOURNIQUET.

The advantages of this Tourniquet are very great. It may be applied with one hand only; and, on being fixed, will re-

main in that ſtate without any attention, or the leaſt danger.

Thus the defects of the former inſtrument are ſupplied; and for every occaſion of the uſe of a Tourniquet, *where there is a want of aſſiſtants*, nothing more uſeful was ever contrived. The ſurgeons on board ſhips of war, in engagements, are oftentimes unable to perform the neceſſary operations on the wounded men as quickly as they are brought to them: by this machine the bleeding from wounds can inſtantly be reſtrained, and then the wounded may ſafely wait till the ſurgeons can calmly and properly execute their duty.——Government has wiſely directed every ſhip to be ſupplied with many ſcrew Tourniquets.

And now, young Gentlemen, after

all that has been ſaid about veſſels and Tourniquets, ſuppoſe either of you were to be wounded by a penknife, or other thing, in the leg, thigh, or arm; a large artery punctured; and, in conſequence, a violent bleeding to enſue. You have no Tourniquet; but you clearly underſtand what has been taught on this ſubject. How, then, would you act? Undoubtedly you would inſtantly pull off your garter, or take the firſt piece of ſtring or ſtrong cord you could find; roll your handkerchief up hard, and lay it on the trunk of the artery above the wounded part; paſs the garter or cord over the handkerchief and round the limb; tie a knot, leaving a proper ſpace; and then twiſt the ligature

by

by any firm body that you could procure.

It may be truly ſaid, that in any branch of medicine "a little learning is a dan-"gerous thing." It was my only intention, to explain to you the means of ſtopping a flow of blood from wounded limbs, and preventing its fatal conſequence *till more effectual aid from ſurgery can be obtained.* It is happy for mankind that profeſſors in this ſcience are fixed in almoſt every town and village, as well as appointed to his majeſty's ſhips of war.

IF this little Tract ſhould perchance be read by any good man, unacquainted with the MARITIME SCHOOL, at CHELSEA; who may be able and diſpoſed to aſſiſt in rewarding the brave defenders of his country, in the perſons of their riſing offspring; of adding ſtrength, and dignity to the navy; and truly ſerving the widow, and orphan; let me, with my hand to my heart, direct him to this hoſpitable, this patriotic ſeminary.